All India Test Series (2023-24)

Test Code: ANY/04 | **AITS TEST - 04** | **YAKEEN NEET**

DURATION: 200 Minutes | **DATE: 03/03/2024** | **M. MARKS: 720**

ANSWER KEY

(PHYSICS)

SECTION-A

1.	(2)	8.	(4)	15.	(4)	22.	(3)	29.	(3)
2.	(2)	9.	(3)	16.	(3)	23.	(2)	30.	(2)
3.	(4)	10.	(2)	17.	(4)	24.	(2)	31.	(4)
4.	(1)	11.	(4)	18.	(4)	25.	(2)	32.	(2)
5.	(3)	12.	(3)	19.	(1)	26.	(3)	33.	(2)
6.	(4)	13.	(4)	20.	(4)	27.	(1)	34.	(3)
7.	(4)	14.	(2)	21.	(4)	28.	(2)	35.	(3)

SECTION-B

36.	(1)	39.	(2)	42.	(1)	45.	(2)	48.	(2)
37.	(1)	40.	(3)	43.	(1)	46.	(3)	49.	(1)
38.	(3)	41.	(1)	44.	(3)	47.	(3)	50.	(3)

(CHEMISTRY)

SECTION-A

51.	(3)	58.	(4)	65.	(4)	72.	(2)	79.	(1)
52.	(2)	59.	(2)	66.	(2)	73.	(2)	80.	(2)
53.	(2)	60.	(3)	67.	(2)	74.	(1)	81.	(3)
54.	(1)	61.	(4)	68.	(3)	75.	(4)	82.	(4)
55.	(3)	62.	(2)	69.	(4)	76.	(3)	83.	(1)
56.	(2)	63.	(2)	70.	(1)	77.	(1)	84.	(4)
57.	(2)	64.	(3)	71.	(2)	78.	(1)	85.	(1)

SECTION-B

86.	(3)	89.	(3)	92.	(1)	95.	(2)	98.	(3)
87.	(1)	90.	(4)	93.	(3)	96.	(2)	99.	(3)
88.	(1)	91.	(1)	94.	(1)	97.	(2)	100.	(3)

(BOTANY)

SECTION-A

101.	(1)	108.	(4)	115.	(2)	122.	(1)	129.	(1)
102.	(1)	109.	(2)	116.	(4)	123.	(4)	130.	(4)
103.	(4)	110.	(3)	117.	(2)	124.	(3)	131.	(2)
104.	(4)	111.	(1)	118.	(2)	125.	(3)	132.	(3)
105.	(3)	112.	(1)	119.	(1)	126.	(3)	133.	(1)
106.	(3)	113.	(4)	120.	(3)	127.	(2)	134.	(2)
107.	(3)	114.	(4)	121.	(1)	128.	(1)	135.	(4)

SECTION-B

136.	(2)	139.	(3)	142.	(3)	145.	(3)	148.	(3)
137.	(4)	140.	(1)	143.	(3)	146.	(1)	149.	(3)
138.	(1)	141.	(3)	144.	(1)	147.	(1)	150.	(1)

(ZOOLOGY)

SECTION-A

151.	(4)	158.	(4)	165.	(4)	172.	(4)	179.	(1)
152.	(2)	159.	(4)	166.	(4)	173.	(2)	180.	(1)
153.	(2)	160.	(4)	167.	(1)	174.	(3)	181.	(2)
154.	(2)	161.	(1)	168.	(4)	175.	(4)	182.	(4)
155.	(4)	162.	(1)	169.	(1)	176.	(4)	183.	(4)
156.	(4)	163.	(1)	170.	(2)	177.	(2)	184.	(2)
157.	(1)	164.	(3)	171.	(1)	178.	(4)	185.	(3)

SECTION-B

186.	(3)	189.	(4)	192.	(1)	195.	(3)	198.	(4)
187.	(4)	190.	(3)	193.	(4)	196.	(1)	199.	(4)
188.	(4)	191.	(1)	194.	(4)	197.	(2)	200.	(2)

Hints & Solutions

[AITS-04 | Dropper/NEET | 03-03-2024]

(PHYSICS)

SECTION-A

1. (2)

The wave pulse is travelling along positive *x*-axis.

Hence, ωt and kx should have opposite signs.

Further, wave speed

$$v = \frac{\text{Coefficient of } t}{\text{Coefficient of } x}$$

$$\therefore\ 3 = \frac{\text{Coefficient of } t}{1}$$

$\therefore$ Coefficient of $t = 3\ s^{-1}$

(NEW NCERT 11th Page No. 284, 285 and 286)

2. (2)

$$K = \frac{E_0}{E} = \frac{4.80\times10^5}{2.60\times10^5}$$

$$\approx 1.85$$

(NEW NCERT 12th Page No. 69 and 70)

3. (4)

$$\vec{F} = m\vec{E} = m\left[\left(-\frac{\partial V}{\partial x}\right)\hat{i} + \left(-\frac{\partial V}{\partial y}\right)\hat{j}\right]$$

$$= 0.2\left[-30\hat{i} + 30\hat{j}\right]\text{ N}$$

$$= 6\left(-\hat{i} + \hat{j}\right)\text{N}$$

$$|\vec{F}| = \sqrt{(-6)^2 + 6^2} = 6\sqrt{2}\text{ N}$$

(NEW NCERT 12th Page No. 134 and 135)

4. (1)

Magnitude of force on +4 μC = qE

$= 4 \times 10^{-6} \times 10^4$ N = 0.04 N

On positive charge, force is in the same direction as that of electric field i.e. due east.

Magnitude of force on −3 μC = qE

$= 3 \times 10^{-6} \times 10^4$ N = 0.03 N

On negative charge, force is in direction opposite to direction of electric field i.e. due west.

(NEW NCERT 12th Page No. 6, 7, 8 and 9)

5. (3)

$$q = \int_0^5 i\,dt = \int_0^5 \left(5 + 3t^2\right)dt$$

$$= \left[5t + t^3\right]_0^5$$

= (25 + 125) C = 150 C

(NEW NCERT 12th Page No. 81 and 82)

6. (4)

Flux, $\phi = \vec{E}.\vec{S}$

$$= \left(\frac{2}{5}\times3\times10^3\hat{i} + \frac{3}{5}\times3\times10^3\,\hat{j}\right).\left(0.5\hat{j}\right)$$

$$= 0.9\times10^3$$

$$= 900\,\text{Nm}^2\text{C}^{-1}$$

(NEW NCERT 12th Page No. 29, 30 and 31)

7. (4)

As electric field is conservative, work done in moving a unit positive charge between two points is path independent and depends only on the initial and final positions.

$W_1 = W_2 = W_3$

(NEW NCERT 12th Page No. 47 and 48)

8. (4)

In parallel combination of bulbs:

Brightness ∝ power consumed by bulb

⇒ Bulb of greater wattage will shine more.

(NEW NCERT 12th Page No. 92 and 93)

9. (3)

$\phi_{net} = \phi_{right} + \phi_{left}$

$$= \left[\alpha(2a)^2\right]a^2\cos0° + \left[\alpha\left(a^2\right)\right]a^2\cos180°$$

$$= 4\alpha a^4 - \alpha a^4 = 3\alpha a^4 = 3\times4(1)^4 = 12\,\text{Nm}^2/\text{C}$$

$$q_{in} = \phi_{net}\,\varepsilon_0 = 12\times8.85\times10^{-12}\text{ C}$$

$$= 106.2\times10^{-12}\text{ C}$$

$$= 10.62\times10^{-11}\text{ C}$$

(NEW NCERT 12th Page No. 33, 34 and 35)

10. (2)

$$a_{max} = \omega^2 A = (2\pi f)^2 A$$

$$= 4\times\pi^2\times16\times4\times10^{-3}$$

$$= 2.524\text{ m/s}^2$$

$$F_{max} = ma_{max}$$

$$= (0.5)(2.524)$$

$$= 1.262\text{ N}$$

(NEW NCERT 11th Page No. 267 and 268)

11. (4)

$V_A = V_D$ and $V_B = V_C$ as the point A and D as well as B and C are lying on the same equipotential surface ($\perp$ to electric field lines.) Further V_A or $V_D > V_B$ or V_C as electric field in the direction of potential decreases.

$V_A - V_B = V_D - V_C = Ed$

$= 15 \times 1 = 15$ V

(NEW NCERT 12th Page No. 54 and 55)

12. (3)

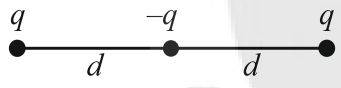
$$R = \rho\frac{l}{A}$$

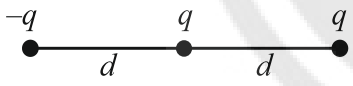
	l	A	Resistance (R)
AB	y	$x \times z$	$\rho\frac{y}{xz}$
EF	x	$y \times z$	$\rho\frac{x}{yz}$

Therefore, ratio of the resistance of the conductor across AB and EF = $\frac{\frac{\rho y}{xz}}{\frac{\rho x}{yx}} = \frac{y^2}{x^2}$

(NEW NCERT 12th Page No. 89 and 90)

13. (4)





$$U_1 = \frac{-kq^2}{d} + \frac{-kq^2}{d} + \frac{kq^2}{2d} = \frac{-3kq^2}{2d}$$

$$U_1 = \frac{-kq^2}{d} + \frac{kq^2}{d} - \frac{kq^2}{2d} = \frac{-kq^2}{2d}$$

So $\frac{U_1}{U_2} = 3:1$

(NEW NCERT 12th Page No. 55, 56 and 57)

14. (2)

$$T \propto \frac{1}{\sqrt{g}} \propto \frac{1}{\sqrt{\frac{M}{R^2}}}$$

Or $T \propto \frac{R}{\sqrt{M}}$

R and M both are tripled. So, T will become $\sqrt{3}$ times.

$\therefore \quad T' = \sqrt{3}T = 2\sqrt{3}\,\text{s}$ (as $T = 2$ s)

(NEW NCERT 11th Page No. 132 and 133)

15. (4)

$I = neAv_d$ i.e. $I \propto v_d$

When current has decreased from $i = 5.40$ A to $i = 1.80$ A, i.e three times, then drift velocity will also decrease three times.

(NEW NCERT 12th Page No. 85, 86, 87 and 88)

16. (3)

From the first law of thermodynamics,

$\Delta U_{AB} = Q_{AB} - W_{AB} = (350 - 150)$ J $= 200$ J

Internal energy is a state function. So, ΔU is zero for a closed path.

Thus, $\Delta U = \Delta U_{AB} + \Delta U_{BA} = 0$

or $\Delta U_{BA} = -\Delta U_{AB} = -200$ J

(NEW NCERT 11th Page No. 230 and 231)

17. (4)

In parallel,

$$P = P_1 + P_2$$

$$= \frac{H}{4} + \frac{H}{8} = \frac{3H}{8}$$

$$\therefore\ t = \frac{H}{P} = \frac{H}{\frac{3H}{8}} = \frac{8}{3} \text{ minutes}$$

(NEW NCERT 12th Page No. 92 and 93)

18. (4)

$$\vec{r}_q = 2\hat{i} + \hat{j} + 3\hat{k}$$

$$\vec{r}_p = \hat{i} - 2\hat{j} + 2\hat{k}$$

$$\vec{r} = \vec{r}_p - \vec{r}_q = -\hat{i} - 3\hat{j} - \hat{k}$$

$$|\vec{r}| = |\vec{r}_p - \vec{r}_q| = \sqrt{(-1)^2 + (-1)^2 + (-1)^2} = \sqrt{11}\,\text{m}$$

Now, $\vec{E} = \frac{kq}{|\vec{r}|^2}\hat{r}$

Substituting the values,

$$\vec{E} = \frac{9\times10^9 \times 1\times10^{-6}}{(11)^{\frac{3}{2}}}\left(-\hat{i} - 3\hat{j} - \hat{k}\right) \text{N/C}$$

$$= \frac{9000}{36.5}\left(-\hat{i} - 3\hat{j} - \hat{k}\right) \text{N/C}$$

$$\approx 246.6\left(-\hat{i} - 3\hat{j} - \hat{k}\right) \text{N/C}$$

(NEW NCERT 12th Page No. 14, 15 and 16)

19. (1)

$T_1 = 273 + 27°C = 300$ K

$T_2 = 273 + 927°C = 1200$ K

$v_{rms} \propto \sqrt{T}$

T has become four times.

Therefore, v_{rms} will become two times.

(NEW NCERT 11th Page No. 246, 247 and 248)

20. (4)

Here, the charge is an electron, i.e.

$q_0 = -1.6 \times 10^{-19}$ C

$V_A = 10$ V

and $V_B = -30$ V

Work done by external force:

$(W_{B-A})_{\text{external force}} = q_0 (V_A - V_B)$

$= \left(-1.6 \times 10^{-19}\right)\left[(10) - (-30)\right]$

$= -6.4 \times 10^{-18}$ J

Work done by electric force:

$(W_{B-A})_{\text{electric force}} = -(W_{B-A})_{\text{external force}}$

$= -(-6.4 \times 10^{-18}\text{ J})$

$= 6.4 \times 10^{-18}$ J

(NEW NCERT 12th Page No. 47 and 48)

21. (4)

$E \propto T$

$\therefore \quad \frac{T_2}{T_1} = \frac{E_2}{E_1} = \frac{3E}{E} = 3$

$\therefore \quad T_2 = 3T_1 = 3(273 + 17)\text{ K}$

$= 870$ K $= 597°C$

(NEW NCERT 11th Page No. 248, 249, 250 and 251)

22. (3)

$$\frac{(v_e)_p}{(v_e)_e} = \frac{\sqrt{\frac{2GM_p}{R_p}}}{\sqrt{\frac{2GM_e}{R_e}}} = \sqrt{\frac{M_p}{M_e} \times \frac{R_e}{R_p}}$$

$$= \sqrt{\frac{8M_e}{M_e} \times \frac{R_e}{\frac{R_e}{8}}} = 8$$

$\therefore \ (v_e)_p = 8 \times (v_e)_e = 8 \times 11 = 88$ km/s

(NEW NCERT 11th Page No. 135 and 136)

23. (2)

PD across each resistance is 12 V.

$i_{3\Omega} = \frac{12\text{V}}{3\Omega} = 4\text{ A}$

$i_{4\Omega} = \frac{12\text{V}}{4\Omega} = 3\text{ A}$

(NEW NCERT 12th Page No. 83 and 84)

24. (2)

According to Newton's law of cooling:

$$\frac{T_1 - T_2}{t} = K\left(\frac{T_1 + T_2}{2} - T_0\right)$$

Since the temperature decreases from 60°C to 40°C in 7 minutes:

$$\frac{60 - 40}{7} = K\left(\frac{60 + 40}{2} - 10\right)$$

$$\Rightarrow \frac{20}{7} = K(50 - 10) \Rightarrow K = \frac{1}{14}$$

If the temperature of object become T_2 in next 7 minutes then: $\frac{40 - T_2}{7} = \frac{1}{14}\left(\frac{40 + T_2}{2} - 10\right)$

$$\Rightarrow 40 - T_2 = \frac{1}{4}(40 + T_2 - 20)$$

$\Rightarrow 160 - 4T_2 = 20 + T_2$

$\Rightarrow 5T_2 = 140 \Rightarrow T_2 = 28°C$

(NEW NCERT 11th Page No. 219, 220 and 221)

25. (2)

If the sphere is replaced by a cube of different volume, then electric flux is not changed because the net charge enclosed is same.

If the charge is moved off-center in the sphere (still remaining inside), then electric flux is not changed because the charge is still enclosed by the surface. The charge need not be at the center.

A second charge is placed near the outside of the original sphere, then the flux will not be changed because the new charge is outside the surface and net charge enclosed is still the same.

(NEW NCERT 11th Page No. 29, 30 and 31)

26. (3)

Stored energy:

$$U = \frac{1}{2}CV^2 = \frac{1}{2}(4\pi \in_0 R)V^2 = \frac{RV^2}{2k}$$

$$= \frac{2 \times 10^{-2} \times 300 \times 300}{2 \times 9 \times 10^9} = 10^{-7}\text{ J}$$

(NEW NCERT 12th Page No. 73, 74 and 75)

27. (1)

Let L_{0S} and L_{0B} be the length of steel and brass rods at 0°C respectively and ΔT be the change in temperature.

For steel:

$L_S = L_{0S}(1 + \alpha_S \Delta T)$

$= L_{0S} + L_{0S} \times 11 \times 10^{-6} \times \Delta T$…….(i)

For brass:

$L_B = L_{0B}(1 + \alpha_B \Delta T)$

$= L_{0B} + L_{0B} \times 19 \times 10^{-6} \times \Delta T$…….(i)

On subtracting equation (i) from (ii):

$L_B - L_S = L_{0B} - L_{0S} + L_{0B} \times 19 \times 10^{-6} \times \Delta T - L_{0S} \times 11 \times 10^{-6} \times \Delta T$

Now, $L_B - L_S = L_{0B} - L_{0S}$

$L_{0S} = \frac{19}{11} L_{0B}$ …….(iii)

Also, given:

$L_{0S} - L_{0B} = 30$ cm

From equation (iii):

$\frac{19}{11} L_{0B} - L_{0B} = 30$ cm

Or $\frac{8}{11} L_{0B} = 30$ cm

$\therefore L_{0B} = 41.25$ cm ……..(iv)

Substitute (iv) in (iii):

$L_{0S} = 71.25$ cm

(NEW NCERT 11th Page No. 204, 205, 206 and 207

28. (2)

$$\frac{1}{4\pi\varepsilon_0}\cdot\frac{q_1 q_2}{r_1^2} = \frac{1}{4\pi\varepsilon_0 k}\cdot\frac{q_1 q_2}{r_2^2}$$

$$\therefore\ r_2 = \frac{r_1}{\sqrt{k}} = \frac{44}{\sqrt{4}} = 22\,\text{m}$$

(NEW NCERT 12th Page No. 6, 7, 8 and 9)

29. (3)

In planetary motion, $\frac{dA}{dt} = \text{constant}$

$\Rightarrow \Delta A \propto \Delta T$

$\frac{\Delta A_{AB}}{\Delta A_{CD}} = \frac{T_{AB}}{T_{CD}}$

$\Rightarrow \frac{A}{2A} = \frac{T_1}{T_2}$

$\Rightarrow T_1 = 0.5T_2$

(NEW NCERT 11th Page No. 128 and 129)

30. (2)

Electric field in vector form can be written as:

$$\vec{E} = \left(120\cos 30°\hat{i} + 120°\sin 30°\hat{j}\right)\text{V/m}$$

$$= \left(60\sqrt{3}\hat{i} + 60°\hat{j}\right)\text{V/m}$$

$$A \equiv (-3m, 0, 0)$$

and $B \equiv (0, 2m, 0)$

$$\therefore\quad V_{BA} = V_B - V_A = -\int_A^B \vec{E}.\,\vec{dr}$$

$$= -\int_{(-3m,0,0)}^{(0,2m,0)} \left(60\sqrt{3}\hat{i} + 60\,\hat{j}\right).\left(dx\,\hat{i} + dy\,\hat{j} + dz\,\hat{k}\right)$$

$$= -\left[60\sqrt{3}x + 60\,y\right]_{(-3m,0,0)}^{(0,2m,0)}$$

$$= -60\left(2 + 3\sqrt{3}\right)\text{V}$$

(NEW NCERT 12th Page No. 54 and 55)

31. (4)

$$R_{AB} = R_0 = R + \frac{R(R + R_0)}{R + (R + R_0)}$$

$$R_0 = R + \frac{R(R + R_0)}{2R + R_0}$$

$$R_0(2R + R_0) = 3R^2 + 2RR_0$$

$$2RR_0 + R_0^2 = 3R^2 + 2RR_0$$

$$\therefore\ R = \frac{R_0}{\sqrt{3}}$$

(NEW NCERT 12th Page No. 85, 86, 87 and 88)

32. (2)

Resistivity of conductors increases with increase in temperature because rate of collisions between free electrons and ions increases with increase of temperature. However, the resistivity of semiconductors decreases with increase in temperature, because more and more covalent bonds are broken at higher temperatures and free electrons increase with increase in temperature.

(NEW NCERT 12th Page No. 90 and 91)

33. (2)

Along the axis of dipole,

$$E = \frac{1}{4\pi\varepsilon_0}\frac{2p}{r^3} \quad \text{…… (i)}$$

This electric field is in the direction of $\vec{p}$.

Along the perpendicular bisector at a distance $\frac{r}{2}$,

$$E' = \frac{1}{4\pi\varepsilon_0}\frac{p}{\left(\frac{r}{2}\right)^3} \quad \text{….. (ii)}$$

From equations (i) and (ii), we can see that

$E' = 4E$

Moreover, $\vec{E}'$ is in the opposite direction of $\vec{p}$. Hence,

$\vec{E}' = -4\vec{E}$

(NEW NCERT 12th Page No. 23, 24 and 25)

34. (3)

$F_1 = \frac{GMm}{4R^2}$

F_2 = Force due to whole sphere – Force due to the sphere forming the cavity

$= \frac{GMm}{4R^2} - \frac{GMm}{18R^2} \Rightarrow \frac{7GMm}{36R^2}$

$\therefore \ \frac{F_2}{F_1} = \frac{7}{9}$

(NEW NCERT 11th Page No. 128 and 129)

35. (3)

Total mechanical energy,

$E = K + U = E_0 - \frac{E_0}{3} = \frac{2E_0}{3} \approx 0.67E_0$

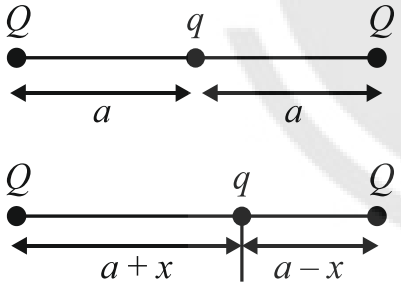
At infinity, $U = 0$

$\therefore \quad K = E = 0.67E_0$

(NEW NCERT 11th Page No. 138 and 139)

SECTION-B

36. (1)



If q is displaced by a distance x from equilibrium position, then net force on it

$F = \frac{kQq}{(a+x)^2} + \frac{-kQq}{(a-x)^2}$

$= \frac{Qq}{4\pi\in_0}\frac{(-4ax)}{(a^2-x^2)^2} = \frac{-Qqa}{\pi\in_0(a^2-x^2)^2}x$

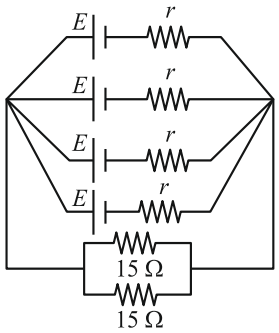
If $x << a$, then $F = \frac{-Qqx}{a^3\pi\in_0}$

$\Rightarrow F \propto -x$, so the particle will undergo S.H.M. and hence

$\omega^2 = \frac{Qq}{ma^3\pi\varepsilon_0} \Rightarrow T = 2\pi\sqrt{\frac{ma^3\pi\varepsilon_0}{Qq}}$

(NEW NCERT 12th Page No. 6, 7, 8 and 9)

37. (1)



Total internal resistance of the cell combination

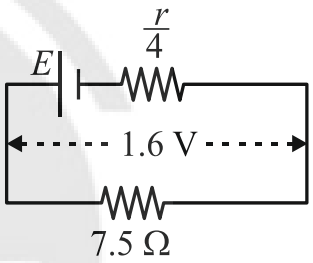
$r_{eq} = \frac{r}{4}$

Total e.m.f. E_{eq} = 2 V

Total external resistance $R = \frac{15\times15}{15+15} = \frac{15}{2} = 7.5\ \Omega$

Current drawn from the equivalent cell

$I = \frac{\text{terminal potential}}{\text{external resistance}} = \frac{1.6}{7.5}$ A



$\because \ E - I\left(\frac{r}{4}\right) = 1.6 \qquad \therefore \ 2 - \frac{1.6}{7.5}\left(\frac{r}{4}\right) = 1.6$

$\Rightarrow r = 7.5\ \Omega$

(NEW NCERT 12th Page No. 95 and 96)

38. (3)

$\because \ h = \frac{2T\cos\theta}{r\rho g}$

$T_1 = \frac{h_1\rho_1 rg}{2\cos\theta_1}$

$T_2 = \frac{h_2\rho_2 rg}{2\cos\theta_2}$

$\frac{T_2}{T_1} = \frac{h_2}{h_1}\cdot\frac{\rho_2}{\rho_1}\cdot\frac{\cos\theta_1}{\cos\theta_2}$

≈ 9.58

(NEW NCERT 11th Page No. 192, 193, 194, 195, 196 and 194)

39. (2)

Work done by electrostatic forces:

$$W = -\Delta U = U_i - U_f$$

$$\therefore \quad U_f = U_i - W$$

$$= \left(-7.2\times10^{-8}\right) - \left(3.6\times10^{-8}\right)$$

$$= -10.8\times10^{-8}\ \text{J}$$

(NEW NCERT 12th Page No. 55, 56 and 57)

40. (3)

$$W = \Delta U = U_f - U_i$$

$$= 3\left(-\frac{GMM}{4l}\right) - 3\left(-\frac{GMM}{2l}\right)$$

$$= \frac{3GM^2}{4l}$$

(NEW NCERT 11th Page No. 134 and 135)

41. (1)

For 1st case:

$$C_1 = C_{RHS} + C_{LHS}$$

$$= \frac{K_2\varepsilon_0\left(\frac{A}{2}\right)}{d} + \frac{K_1\varepsilon_0\left(\frac{A}{2}\right)}{d}$$

$$= \frac{\varepsilon_0 A}{2d}(K_1 + K_2) = \frac{7\varepsilon_0 A}{2d}$$

For 2nd case:

$$\frac{1}{C_2} = \frac{\frac{d}{2}}{K_1\varepsilon_0 A} + \frac{\frac{d}{2}}{K_2\varepsilon_0 A}$$

$$\frac{1}{C_2} = \frac{d}{2\varepsilon_0 A}\left(\frac{1}{K_1} + \frac{1}{K_2}\right)$$

$$C_2 = \left(\frac{K_1K_2}{K_1 + K_2}\right)\frac{2\varepsilon_0 A}{d}$$

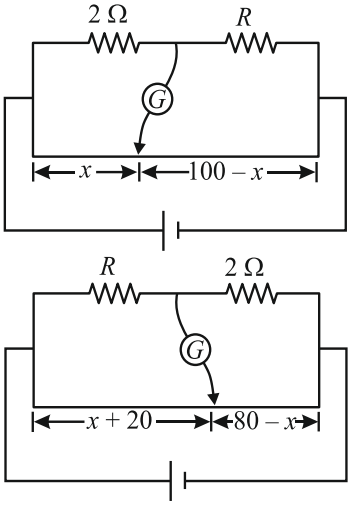
$$C_2 = \frac{2\varepsilon_0 A}{d}\left(\frac{3\times4}{3+4}\right) = \frac{24\varepsilon_0 A}{7d}$$

$$\therefore \quad \frac{C_1}{C_2} = \frac{\frac{7}{2}}{\frac{24}{7}} = \frac{49}{48}$$

(NEW NCERT 12th Page No. 71, 72 and 73)

42. (1)

$R > 2\ \Omega \Rightarrow 100 - x > x$



Applying $\frac{P}{Q} = \frac{R}{S}$

We have $\frac{2}{R} = \frac{x}{100 - x}$ …(i)

And $\frac{R}{2} = \frac{x + 20}{80 - x}$ …(ii)

Solving Eqs. (i) and (ii), we get $R = 3\ \Omega$

(NEW NCERT 12th Page No. 100, 101 and 102)

43. (1)

$$|\vec{a}| = \left|\frac{q\vec{E}}{m}\right| = \left|\frac{q\sigma}{2\varepsilon_0 m}\right|$$

$$t = \sqrt{\frac{2s}{a}} = \sqrt{\frac{4s\varepsilon_0 m}{|q||\sigma|}}$$

$$t = \sqrt{\frac{4\times0.1\times8.86\times10^{-12}\times1.6\times10^{-27}}{1.6\times10^{-19}\times2.21\times10^{-9}}}$$

$t = 4 \times 10^{-6}$ s

(NEW NCERT 12th Page No. 28 and 29)

44. (3)

$$v_T \propto r^2 \qquad \text{..... (i)}$$

Let r be the radius of small rain drops and R the radius of large drop.

Equating the volumes, we have:

$$\frac{4}{3}\pi R^3 = 8\left(\frac{4}{3}\pi r^3\right)$$

$$\therefore \quad R = (8)^{\frac{1}{3}}.\, r \ \text{ or } \ \frac{R}{r} = (8)^{\frac{1}{3}} = 2$$

$$\therefore \quad \frac{v_T'}{v_T} = \left(\frac{R}{r}\right)^2 = 2^2 = 4$$

$$\therefore \quad v_T' = 4v_T$$

$$\therefore \quad v_T' = 4.0\ \text{m/s}$$

(NEW NCERT 11th Page No. 190, 191 and 192)

45. (2)

W = energy of satellite in second orbit – energy in first orbit.

$$= -\frac{GMm}{2(5R)} - \left[\frac{-GMm}{2(3R)}\right]$$

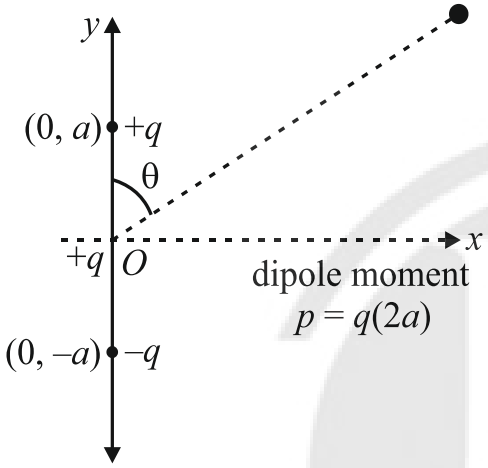
$$= \frac{1}{15}\frac{GMm}{R} = \frac{1}{15}mgR$$

$$= \frac{1}{15}\times 2\times 10^3 \times 10 \times 6.4\times 10^6$$

$\approx 0.85 \times 10^{10}$ J

(NEW NCERT 11th Page No. 138 and 139)

46. (3)



Potential at point P due to charge q (placed at origin) is: $V_0 = \frac{kq}{r}$

Potential due to remaining charge system (dipole) can be written as:

$$V_d = \frac{kp}{r^2}\cos\theta = \frac{kq2a\cos\theta}{r^2}$$

Hence $V_p = V_0 + V_d = \frac{kq}{r}\left[1 + \frac{2a\cos\theta}{r}\right]$

(NEW NCERT 12th Page No. 49, 50 and 51)

47. (3)

$F = kx$

$$\Delta F = k(\Delta x)$$

$$\therefore \quad k = \frac{\Delta F}{\Delta x} = \frac{6}{0.04} = 150 \text{ N/m}$$

$$m = \frac{W}{g} = \frac{15}{10} = 1.5 \text{ kg}$$

$$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{1.5}{150}}$$

$= 0.628$ s

(NEW NCERT 11th Page No. 167 and 168)

48. (2)

Applying junction rule to C and D:

$I = I_1 + I_2$ ….. (i)

10 V battery is connected alone across CD so,

$V_D - V_C = 10$ V

$$\therefore \quad I_2 = \frac{V_C - V_D}{2\ \Omega} = \frac{-10\text{V}}{2\ \Omega} = -5A$$

(Negative sign indicates current I_2 is from D to C)

Applying loop rule to $CDEFGC$:

$-2I_2 - 5I - 3I + 20 = 0$

$$\Rightarrow \quad -2(-5) - 8I + 20 = 0$$

$$\Rightarrow \quad I = \frac{30}{8} = \frac{15}{4}A$$

From equation (i), we get

$$I_1 = I - I_2 = \frac{15}{4}A - (-5A) = \left(\frac{15}{4} + 5\right)A = \frac{35}{4}A$$

(NEW NCERT 12th Page No. 97, 98 99 and 100)

49. (1)

$$TV^{\gamma-1} = \text{constant} \Rightarrow T_2 = \left(\frac{V_1}{V_2}\right)^{\gamma-1} T_1$$

$$T_2 = \left(\frac{V}{V/5}\right)^{1.4-1} \times 303 \text{ K}$$

$$= 303 \times (5)^{0.4} \text{ K}$$

(NEW NCERT 11th Page No. 233, 234 and 235)

50. (3)

$f \propto \sqrt{T}$ ($T \rightarrow$ tension)

$$\therefore \quad \frac{f_1}{f_2} = \sqrt{\frac{T_1}{T_2}} \Rightarrow T_2 = T_1\left(\frac{f_2}{f_1}\right)^2$$

$$\Rightarrow \quad T_2 = 12\left(\frac{270}{300}\right)^2 = 9.72 \text{ kg wt}$$

$\Delta T = T_1 - T_2 = 12 - 9.72 = 2.28$ kg wt.

(NEW NCERT 11th Page No. 284, 285 and 286)

(CHEMISTRY)

SECTION-A

51. (3)

From atomic number 104 to 118 belongs to period 7

Group number = last two digit of atomic number.

$Z = 115 \rightarrow 15^{th}$ group, 7^{th} period.

(OLD NCERT 11th Part-I Page No. 77)

52. (2)

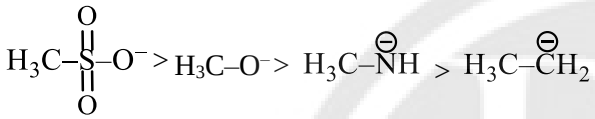
Lower the value of Henry's constant, higher is the solubility of gas.

(NEW NCERT 12th Part-I Page No. 07)

53. (2)

Leaving group tendency α stability of anion.

So the stability order is:



(NEW NCERT 12th Part-II Page No. 172)

54. (1)

For 1 electron species:

$E_1 = -13.6$ eV

$E_2 = -3.4$ eV

$E_3 = -1.51$ eV

$E_4 = -0.85$ eV

$E_2 - E_1 = 10.2$ eV

$E_3 - E_2 = 1.89$ eV

$E_4 - E_3 = 0.66$ eV

$(E_2 - E_1) > (E_3 - E_2) > (E_4 - E_3)$

(NEW NCERT 11th Part-I Page No. 57)

55. (3)

$$\frac{V}{V}\% = \frac{\text{Volume of solute}}{\text{Volume of Solution}} \times 100$$

$$= \frac{15}{(15+75)} \times 100 = \frac{15}{90} \times 100 = \frac{150}{9} = 16.67$$

(NEW NCERT 12th Part-I Page No. 02)

56. (2)

If weight of oxide = 100

Than weight of oxygen = 30

Weight of element = 100 – 30 = 70

$$\text{Equivalent weight of element} = \frac{\text{Weight of element}}{\text{Weight of oxygen}} \times 8$$

$$= \frac{70}{30} \times 8 = \frac{56}{3} = 18.66$$

(NEW NCERT 11th Part-I Page No. 14)

57. (2)

Among isoelectronic species: Cations are smaller than their parent atom and anions are larger.

(NEW NCERT 11th Part-I Page No. 70)

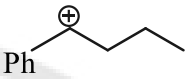
58. (4)

The correct IUPAC name is, 4-iodo-2-methyl phenol.

(NEW NCERT 11th Part-II Page No. 262)

59. (2)

Option (2) is most reactive towards S_N1 reaction among all, as it gives the most stable carbocation.



(NEW NCERT 12th Part-II Page No. 169)

60. (3)

Methanol and water form hydrogen bond between them. This bonding is stronger than that between methanol molecules but the interaction are not as extensive as in water. Thus, it has a vapour pressure lower than methanol and higher than water.

(NEW NCERT 12th Part-I Page No. 03)

61. (4)

The oxidation number of sulphur in $Na_2S_2O_3$ and $Na_2S_4O_6$ are (+2) and (+2.5) respectively.

(NEW NCERT 12th Part-II Page No. 239)

62. (2)

$$M = \frac{1000 \times K_b \times w}{\Delta T_b \times W}$$

Given $K_b = 0.52$

w = mass of solute = 5 g

W = mass of solvent = 100 g

ΔT_b = Elevation in boiling point = 0.60ºC

M = Molecular weight = ??

$$M = \frac{1000 \times 0.52 \times 5}{0.60 \times 100} = 43.33$$

(NEW NCERT 12th Part-I Page No. 15)

63. (2)

In the option (2), S_N2 reaction is not possible because it will violate the Bredt's rule.

(NEW NCERT 12th Part-II Page No. 169)

64. **(3)**

$P^0_{CHCl_3} = 200\ atm,\ P^0_{CH_2Cl_2} = 41.5\ atm$

$n_{CHCl_3} = \frac{11.9}{119.5} = 0.1,\ n_{CH_2Cl_2} = \frac{17}{85} = 0.2$

$P_T = P^0_A X_A + P^0_B X_B = 200 \times \frac{0.1}{0.3} + 41.5 \times \frac{0.2}{0.3} = 94.3 atm$

(NEW NCERT 12th Part-I Page No. 03)

65. **(4)**

We have oxygen and sulphur which are elements are of same group, the difference is that sulphur is having larger size than oxygen thus if we add one electron in outermost of sulphur it feel less repulsion from electrons. This repulsion is higher for oxygen due to its small size and higher electron repulsion. So electron affinity is more in sulphur than oxygen.

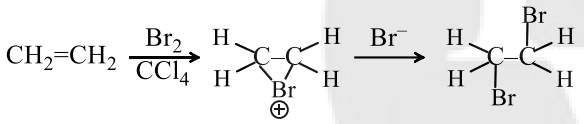
(NEW NCERT 11th Part-I Page No. 82)

66. **(2)**

When alkyne react with Na/liq NH_3, trans alkene form. When alkyne react with lindlar catalyst, cis alkene form.

(NEW NCERT 11th Part-II Page No. 300)

67. **(2)**



(NEW NCERT 11th Part-II Page No. 311)

68. **(3)**

If mole fraction of the solvent in solution decreases then mole fraction of solute increase so osmotic pressure increases.

(NEW NCERT 12th Part-I Page No. 03)

69. **(4)**

Rate of E_2 reaction $\propto$ stability of alkene formed.

(NEW NCERT 12th Part-II Page No. 179)

70. **(1)**

In (A) $\rightarrow$ The configuration belongs to (He) which has highest first ionisation energy among all the element in periodic table.

In (B) $\rightarrow$ The configuration belong to (F) which has highest electronegativity on Pauling scale.

In (C) $\rightarrow$ The configuration belongs to Cl, which has maximum electron gain enthalpy.

In (D) $\rightarrow$ The configuration belongs to (C) and it shows (–4) oxidation state because it attain inert gas configuration of near by gaining four electron.

(NEW NCERT 11th Part-I Page No. 90)

71. **(2)**

$R–OH + SOCl_2 \rightarrow R–Cl + SO_2 + HCl$

Above reaction is best method for replacing –OH group because after the reaction in the product side the SO_2 gas and HCl gas will vapourise. Only Pure R–Cl compound will form.

(NEW NCERT 12th Part-II Page No. 169)

72. **(2)**

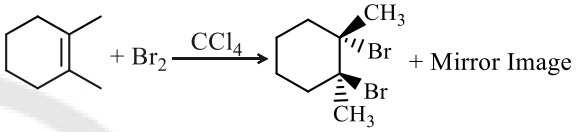
Relative lowering vapour pressure:

$\frac{Po - Ps}{Po} = N_2 (Mole\ fraction\ of\ solute)$

(NEW NCERT 12th Part-I Page No. 03)

73. **(2)**

Addition of Br_2 follows anti-addition.



(NEW NCERT 12th Part-II Page No. 166)

74. **(1)**

Internal energy depends upon initial and final values so it is a state function.

(NEW NCERT 11th Part-I Page No. 139)

75. **(4)**

The given species are single electron species so they do not show screening effect.

(NEW NCERT 11th Part-I Page No. 60)

76. **(3)**

In the given option (1) Li and Mg, (2) Be and Al, (4) B and Si all shows diagonal relationship with each other so they will show the similar radius.

(NEW NCERT 11th Part-I Page No. 85)

77. **(1)**

In the option (I), both Cl group and both methyl group are trans to each other so it will be most stable.

(NEW NCERT 11th Part-II Page No. 270)

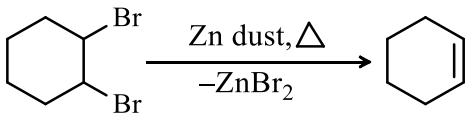
78. **(1)**

$\underset{\text{Basic oxide}}{Na_2O} + H_2O \rightarrow \underset{\text{Stronge base}}{2NaOH}$

$\underset{\text{acidic oxide}}{Cl_2O_7} + H_2O \rightarrow \underset{\text{Strong acid}}{2HClO_4}$

(NEW NCERT 11th Part-I Page No. 94)

79. **(1)**



(NEW NCERT 12th Part-II Page No. 179)

80. **(2)**

$Hg_2Cl_2 \rightarrow Hg_2^{2+} + 2Cl^-, i = 3$

$NaCl \rightarrow Na^+ + Cl^-, i = 2$

$Na_2SO_4 \rightarrow 2Na^+ + SO_4^{2-}, i = 3$

$Al(NO_3)_3 \rightarrow Al^{3+} + 3NO_3^-, i = 4$

$Al_2(SO_4)_3 \rightarrow 2Al^{3+} + 3SO_4^{-2}, i = 5$

(NEW NCERT 12th Part-I Page No. 24)

81. **(3)**

The given reaction is S_N2 reaction, and rate of reaction $\propto$ [R–X] [Nu^-]

(NEW NCERT 12th Part-II Page No. 165)

82. **(4)**

Ionisation of H_2O increases, as the temperature increases.

(NEW NCERT 11th Part-I Page No. 204)

83. **(1)**

Isotopes have same number of protons and electrons.

(NEW NCERT 11th Part-I Page No. 92)

84. **(4)**

Ionisation energy order: Hf > Zr

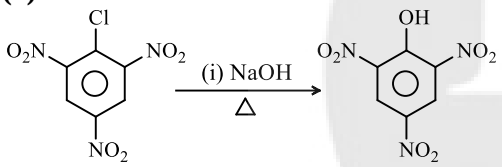
Radii order: Ne > Na^+

Electronegativity order: $[He]2s^22p^4 > [He]2s^22p^3$

Electron gain enthalpy order: S > O

(NEW NCERT 11th Part-I Page No. 85)

85. **(1)**



(NEW NCERT 12th Part-II Page No. 237)

SECTION-B

86. **(3)**

Option (3) contain only two types of carbon atom.

(NEW NCERT 11th Part-II Page No. 262)

87. **(1)**

For an ideal solution (Benzene + Toluene):

$\Delta H_{mix} = \Delta V_{mix} = 0$

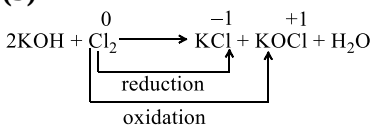
(NEW NCERT 12th Part-I Page No. 10)

88. **(1)**

The electron affinity order in the halogen group are: Cl > F > Br >I

(NEW NCERT 11th Part-I Page No. 92)

89. **(3)**



(NEW NCERT 11th Part-II Page No. 244)

90. **(4)**

In the both given reaction rearrangement are not observed, so both the reactions follow S_N2 mechanism.

(NEW NCERT 12th Part-II Page No. 238)

91. **(1)**

$2KI + HgI_2 \rightarrow K_2[HgI_4] \rightleftharpoons 2K^+ + [HgI_4]^{2-}$,

Thus there is net decrease in number of ions present in solution and freezing point is raised.

(NEW NCERT 12th Part-I Page No. 03)

92. **(1)**

$$r = 0.529 \times \frac{n^2}{Z}\,\text{Å} = 0.529 \times \frac{1^2}{1}\,\text{Å} = 0.529 \times 10^{-8}\ \text{cm}$$

(NEW NCERT 11th Part-I Page No. 46)

93. **(3)**

For removing second electron, it has to be taken out from stable configuration that needs a large amount of energy.

(NEW NCERT 11th Part-I Page No. 92)

94. **(1)**

Amphoteric oxides behave as acidic with bases and basic with acids.

(NEW NCERT 11th Part-I Page No. 94)

95. **(2)**

According to Avogadro's law equal volume of all gaseous contain equal number of molecule under same condition of temperature and pressure. Thus if 1L of one gas contain N molecules, 5L of gas under the same condition will contain 5N molecules.

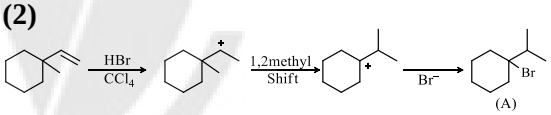
(NEW NCERT 11th Part-I Page No. 19)

96. **(2)**

In polar aprotic solvent, nucleophilicity decreases down the group.

(NEW NCERT 12th Part-II Page No. 172)

97. **(2)**



(NEW NCERT 11th Part-II Page No. 272)

98. **(3)**

$$\Delta H = (n_1 C p_1 m_1 + n_2 C p_2 m_2)\Delta T$$

$$= \left(0.5 \times \frac{7}{2} R + 0.5 \times 4R\right)(-100)$$

$$= -375R$$

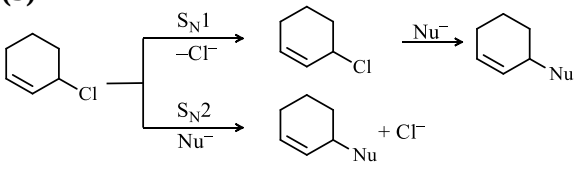
(OLD NCERT 11th Part-I Page No. 139)

99. **(3)**

$BaCl_2$ gives maximum ion (3 ion) in the solution and NaCl gives 2 ions.

(NEW NCERT 12th Part-I Page No. 15)

100. **(3)**



(NEW NCERT 12th Part-II Page No. 169)

(BOTANY)

SECTION-A

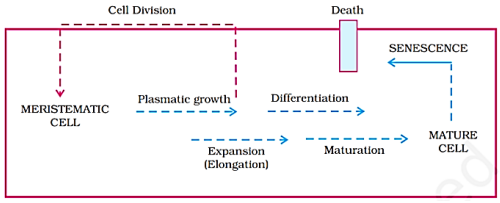
101. (1)

The cells of epidermis bear a number of hairs. On the stem the epidermal hairs are called trichomes.

(NEW NCERT 11th Page No. 72)

102. (1)

Sequence of the developmental process in a plant cell.



(NEW NCERT 11th Page No. 173)

103. (4)

Abscisic acid (ABA) was discovered for its role in regulating abscission and dormancy. It also has other wide-ranging effects on plant growth and development. It acts as a general plant growth inhibitor and an inhibitor of plant metabolism.

(NEW NCERT 11th Page No. 177)

104. (4)

Spraying juvenile conifers with GAs hastens the maturity period, thus leading to early seed production.

Ethylene is used to initiate flowering and for synchronising fruit-set in pineapples.

(NEW NCERT 11th Page No. 176, 177)

105. (3)

Auxin controls xylem differentiation and helps in cell division.

Influences of ethylene on plants include horizontal growth of seedlings, swelling of the axis and apical hook formation in dicot seedlings.

(NEW NCERT 11th Page No. 176, 177)

106. (3)

The plant growth regulators (PGRs) are small, simple molecules of diverse chemical composition. They could be indole compounds (indole-3-acetic acid, IAA); adenine derivatives (N^6-furfurylamino purine, kinetin), derivatives of carotenoids (abscisic acid, ABA); terpenes (gibberellic acid, GA_3) or gases (ethylene, C_2H_4).

(NEW NCERT 11th Page No. 174)

107. (3)

Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called plasticity. In plants like cotton, coriander and larkspur; the leaves of the juvenile plant are different in shape from those in mature plants.

On the other hand, difference in shapes of leaves produced in air and those produced in water in buttercup also represent the heterophyllous development due to environment.

(NEW NCERT 11th Page No. 173)

108. (4)

Cytokinin have specific effects on cytokinesis, and were discovered as kinetin (a modified form of adenine, a purine) from the autoclaved herring sperm DNA.

(NEW NCERT 11th Page No. 176)

109. (2)

The hard outer layer of pollen grain called the exine is made up of sporopollenin which is one of the most resistant organic material known. It can withstand high temperatures and strong acids and alkali. No enzyme that degrades sporopollenin is so far known. Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent. Pollen grains are well preserved as fossils because of the presence of sporopollenin.

(NEW NCERT 12th Page No. 7)

110. (3)

PMC- 2n, antipodal- n, synergid- n

(NEW NCERT 12th Page No. 6, 10)

111. (1)

Cleistogamous flowers have closed anthers and stigma and do not open al all. In such flowers, the anthers and stigma lie close to each other. When anthers dehisce in the flower buds, pollen grains come in contact with the stigma to effect pollination.

Cleistogamous flowers produce assured seed-set even in the absence of pollinators.

(NEW NCERT 12th Page No. 12)

112. (1)

Some examples of water pollinated plants are v*allisneria* and *Hydrilla* which grow in fresh water and several marine sea-grasses such as *Zostera*.

Not all aquatic plants use water for pollination. In a majority of aquatic plants such as water hyacinth and water lily, the flowers emerge above the level of water and are pollinated by insects or wind as in most land plants.

(NEW NCERT 12th Page No. 13)

113. (4)

If both male and female flowers are present on the same plant such as castor and maize (monoecious), it prevents autogamy but not geitonogamy.

(NEW NCERT 12th Page No. 15)

114. (4)

If the female parent produces unisexual flowers, there is no need for emasculation. The female flower buds are bagged before the flowers open. When the stigma becomes receptive, pollination is carried out using the desired pollen and the flower rebagged.

(NEW NCERT 12th Page No. 17)

115. (2)

The egg apparatus consists of two synergids and one egg cell. The synergids have special cellular thickenings at the micropylar tip called filiform apparatus, which play an important role in guiding the pollen tubes into the synergid.

(NEW NCERT 12th Page No. 11)

116. (4)

Tassels of a corn cob	Trap pollen grains
Oxalis	Produce two types of flowers
Yucca	Gets pollinated by moth
Amorphophallus	Flower is 6 feet in height

(NEW NCERT 12th Page No. 12, 13, 14)

117. (2)

The figure represents multicarpellary, syncarpous pistil of *Papaver*.

(NEW NCERT 12th Page No. 09)

118. (2)

The categories like species, genus and families are based on a number of similar characters. Generally, order and other higher taxonomic categories are identified based on the aggregates of characters.

(NEW NCERT 11th Page No. 07)

119. (1)

Cilia (sing.: cilium) and flagella (sing.: flagellum) are hair-like outgrowths of the cell membrane. Cilia are small structures which work like oars, causing the movement of either the cell or the surrounding fluid. Flagella are comparatively longer and responsible for cell movement. The prokaryotic bacteria also possess flagella but these are structurally different from that of the eukaryotic flagella.

(NEW NCERT 11th Page No. 99)

120. (3)

In ascomycetes, sexual spores are called ascospores which are produced endogenously in sac like asci (singular ascus).

(NEW NCERT 11th Page No. 18)

121. (1)

Prophase which is the first stage of karyokinesis of mitosis follows the S and G_2 phases of interphase.

In the S and G_2 phases the new DNA molecules formed are not distinct but intertwined.

Prophase is marked by the initiation of condensation of chromosomal material.

(NEW NCERT 11th Page No. 122)

122. (1)

In the hypogynous flower the gynoecium occupies the highest position while the other parts are situated below it. The ovary in such flowers is said to be superior, e.g., mustard, china rose and brinjal.

(NEW NCERT 11th Page No. 63)

123. (4)

In dicot root, next to endodermis lies a few layers of thick-walled parenchymatous cells referred to as pericycle. Initiation of lateral roots and vascular cambium during the secondary growth takes place in these cells.

(NEW NCERT 11th Page No.74)

124. (3)

The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the protonema stage, which develops directly from a spore. It is a creeping, green, branched and frequently filamentous stage.

(NEW NCERT 11th Page No. 30)

125. (3)

The Calvin pathway is common to the C_3 and C_4 plants.

RuBisCO is the most abundant enzyme in the world.

Photorespiration doesn't occur in C_4 plants.

The primary CO_2 acceptor in C_4 plants is a 3-carbon molecule phosphoenol pyruvate (PEP) and is present in the mesophyll cells. The enzyme responsible for this fixation is PEP carboxylase or PEPcase.

(NEW NCERT 11th Page No. 146)

126. (3)

In fermentation by yeast, the incomplete oxidation of glucose is achieved under anaerobic conditions by sets of reactions where pyruvic acid is converted to CO_2 and ethanol. The enzymes, pyruvic acid decarboxylase and alcohol dehydrogenase catalyse these reactions.

(NEW NCERT 11th Page No. 157)

127. (2)

In RNA instead of Thymine, Uracil is present.

(NEW NCERT 12th Page No. 80)

128. (1)

Adenine binds to thymine by 2 hydrogen bonds. The backbone is constituted by sugar-phosphate, and the bases project inside. The pitch of the helix is 3.4 nm.

(NEW NCERT 12th Page No. 81)

129. (1)

In bacteria, since the mRNA does not require any processing to become active, and also since transcription and translation take place in the same compartment (there is no separation of cytosol and nucleus in bacteria), many times the translation can begin much before the mRNA is fully transcribed. Consequently, the transcription and translation can be coupled in bacteria.

(NEW NCERT 12th Page No. 94)

130. (4)

The RNA polymerase II transcribes precursor of mRNA, the heterogeneous nuclear RNA (hnRNA). The RNA polymerase I transcribes rRNAs (28S, 18S, and 5.8S).

(NEW NCERT 12th Page No. 95)

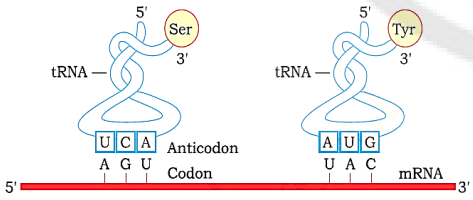
131. (2)

AUG has dual functions. It codes for Methionine (met) and also acts as initiator codon.

(NEW NCERT 12th Page No. 96)

132. (3)

tRNA has an anticodon loop that has bases complementary to the code, and it also has an amino acid acceptor end to which it binds to amino acids.



(NEW NCERT 12th Page No. 98)

133. (1)

5' AUGUCGUAGCUUGCAUGAC 3'

The sequence of mRNA produced is similar to that of coding strand with the only difference being the presence of Uracil in place of Thymine.

(NEW NCERT 12th Page No. 92)

134. (2)

The *i* gene codes for the repressor of the *lac* operon. The *z* gene codes for beta-galactosidase (β-gal), which is primarily responsible for the hydrolysis of the disaccharide, lactose into its monomeric units, galactose and glucose. The *y* gene codes for permease, which increases permeability of the cell to β-galactosides. The *a* gene encodes a transacetylase.

(NEW NCERT 12th Page No. 100)

135. (4)

The ribosome consists of structural RNAs and about 80 different proteins. In its inactive state, it exists as two subunits: a large subunit and a small subunit. When the small subunit encounters an mRNA, the process of translation of the mRNA to protein begins.

(NEW NCERT 12th Page No. 99)

136. (2)

One single maize root apical meristem can give rise to more than 17,500 new cells per hour, whereas cells in a watermelon may increase in size by upto 3,50,000 times.

(NEW NCERT 11th Page No. 168)

137. (4)

Ethylene	H.H. Cousins
Kinetin	Miller et al.
Gibberellic acid.	E. Kurosawa
Auxin	F.W. Went

(NEW NCERT 11th Page No. 175)

138. (1)

Mature seeds may be non-albuminous or ex-albuminous.

Non-albuminous seeds have no residual endosperm as it is completely consumed during embryo development (e.g., pea, groundnut).

Albuminous seeds retain a part of endosperm as it is not completely used up during embryo development (e.g., wheat, maize, barley, castor).

(NEW NCERT 12th Page No. 20)

139. (3)

Seeds enter the stage of dormancy during unfavourable conditions.

(NEW NCERT 12th Page No. 20)

140. (1)

In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures.

In geometric growth, both the progeny cells following mitotic cell division retain the ability to divide and continue to do so.

Arithmetic growth is exemplified by root elongating at a constant rate.

Stages during embryo development shows both geometric and arithematic phases.

(NEW NCERT 11th Page No. 170)

141. (3)

In opposite phyllotaxy, a pair of leaves arise at each node and lie opposite to each other as in *Calotropis* and guava plants.

If more than two leaves arise at a node and form a whorl, it is called whorled, as in *Alstonia.*

(NEW NCERT 11th Page No. 61)

142. (3)

The nuclear matrix or the nucleoplasm contains nucleolus and chromatin. The nucleoli are spherical structures present in the nucleoplasm. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis. Larger and more numerous nucleoli are present in cells actively carrying out protein synthesis.

(NEW NCERT 11th Page No. 100)

143. (3)

Zygotene is the second stage of prophase-I. During this stage chromosomes start pairing together and this process of association is called synapsis. Such paired chromosomes are called homologous chromosomes. Electron micrographs of this stage indicate that chromosome synapsis is accompanied by the formation of complex structure called synaptonemal complex. The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad.

(NEW NCERT 11th Page No. 126)

144. (1)

Glucose is the favoured substrate for respiration. All carbohydrates are usually first converted into glucose before they are used for respiration.

Because the respiratory pathway is involved in both anabolism and catabolism, it would hence be better to consider the respiratory pathway as an amphibolic pathway.

If fatty acids were to be respired they would first be degraded to acetyl CoA and enter the pathway.

(NEW NCERT 11th Page No. 162)

145. (3)

The Carbon dioxide is the major limiting factor for photosynthesis. The concentration of CO_2 is very low in the atmosphere (between 0.03 and 0.04 per cent). Increase in concentration up to 0.05 per cent can cause an increase in CO_2 fixation rates; beyond this the levels can become damaging over longer periods.

(NEW NCERT 11th Page No. 150)

146. (1)

Both DNA and RNA are able to mutate. In fact, RNA being unstable, mutate at a faster rate. Consequently, viruses having RNA genome and having shorter life span mutate and evolve faster.

DNA chemically is less reactive and structurally more stable when compared to RNA. Therefore, among the two nucleic acids, the DNA is a better genetic material. In fact, the presence of thymine at the place of uracil also confers additional stability to DNA.

(NEW NCERT 12th Page No. 87)

147. (1)

DNA extracted from the culture after 4 generations will have-1 hybrid (^{15}N ^{14}N) and rest 15 light (^{14}N ^{14}N).

(NEW NCERT 12th Page No. 89)

148. (3)

The RNA polymerase is only capable of catalysing the process of elongation. It associates transiently with initiation-factor (σ) and termination-factor (ρ) to initiate and terminate the transcription, respectively.

In capping an unusual nucleotide (methyl guanosine triphosphate) is added to the 5′-end of hnRNA. In tailing, adenylate residues (200-300) are added at 3′-end in a template independent manner.

(NEW NCERT 12th Page No. 94, 95)

149. (3)

A molecule that can act as a genetic material must fulfill the following criteria:

(i) It should be able to generate its replica (Replication).

(ii) It should be stable chemically and structurally.

(iii) It should provide the scope for slow changes (mutation) that are required for evolution.

(iv) It should be able to express itself in the form of 'Mendelian Characters'.

(NEW NCERT 12th Page No. 87)

150. (1)

The technique of DNA Fingerprinting was initially developed by Alec Jeffreys. He used a satellite DNA as probe that shows very high degree of polymorphism. It was called as Variable Number of Tandem Repeats (VNTR). The size of VNTR varies in size from 0.1 to 20 kb.

(NEW NCERT 12th Page No. 106)

(ZOOLOGY)

SECTION-A

151. (4)

Body is covered by a calcareous shell and is unsegmented with a distinct head, muscular foot and visceral hump in animals belonging to phylum Mollusca.

(New NCERT, 11th, Page No.-44)

152. (2)

The correct order of chemical composition of living tissues/cells in terms of percentage of the total cellular mass is: Water > Protein > Nucleic acid > Carbohydrate > Lipid > Ions.

(New NCERT, 11th, Page No.-109)

153. (2)

Exchange part is the site of actual diffusion of oxygen and carbon dioxide between blood and atmospheric air. The lungs are situated in the thoracic chamber which is anatomically an air-tight chamber. The thoracic chamber is formed dorsally by the vertebral column, ventrally by the sternum, laterally by the ribs and on the lower side by the dome-shaped diaphragm.

(New NCERT, 11th, Page No.-185)

154. (2)

Hormones which interact with intracellular receptors are steroid hormones (e.g., cortisol, testosterone, estradiol and progesterone) and iodothyronines (thyroid hormones) etc.

(New NCERT, 11th, Page No.-248)

155. (4)

Pleurobrachia are ctenophores which are exclusively marine, radially symmetrical, diploblastic organisms with tissue level of organisation.

(New NCERT, 11th, Page No.-42)

156. (4)

Secondary metabolites are found in plants, fungi and microbes. We do not at the moment, understand the role or functions of all the 'secondary metabolites' in host organisms. However, many of them are useful to 'human welfare' (e.g., rubber, drugs, spices, scents and pigments). Some secondary metabolites have ecological importance.

(New NCERT, 11th, Page No.-108)

157. (1)

Sea fan (*Gorgonia*) belongs to phylum Coelenterata which contain the stinging capsules or nematocysts present on the tentacles and the body.

(New NCERT, 11th, Page No.-41)

158. (4)

The sequence of systemic circulation is:- Left atria → Left ventricle → Aorta → Arteries → Tissues →Veins → Right atria

(New NCERT, 11th, Page No.-201)

159. (4)

Hormones produce their effects on target tissues by binding to specific proteins called hormone receptors located in the target tissues only. Each receptor is specific to one hormone only and hence receptors are specific.

(New NCERT, 11th, Page No.-247)

160. (4)

Relative abundance of carbon and hydrogen with respect to other elements is higher in any living organisms than in earth's crust. Living organisms have less Ca, Mg and Na than earth crust.

(New NCERT, 11th, Page No.-104, 105)

161. (1)

Locusta (Locust) is gregarious pest.

(New NCERT, 11th, Page No.-44)

162. (1)

Lysine is basic amino acid but not aromatic amino acid whereas tyrosine, phenylalanine and tryptophan are aromatic amino acids.

(New NCERT, 11th, Page No.- 106)

163. (1)

Ichthyophis is a limbless amphibian. *Hyla*, *Rana* and *Salamandra* are amphibians which have limbs in their body.

(New NCERT, 11th, Page No.-48)

164. (3)

Androgens (mainly testosterone) regulate the development, maturation and functions of the male accessory sex organs like epididymis, vas deferens, seminal vesicles, prostate gland, urethra etc. These hormones stimulate muscular growth, growth of facial and axillary hair, aggressiveness, low pitch of voice etc. Androgens play a major stimulatory

role in the process of spermatogenesis (formation of spermatozoa). Androgens act on the central neural system and influence the male sexual behaviour (libido). These hormones produce anabolic (synthetic) effects on protein and carbohydrate metabolism.

(New NCERT, 11th, Page No.-246)

165. (4)

There are four substituent groups occupying the four valency positions in amino acids. These are hydrogen, carboxyl group, amino group and a variable group designated as R group. Based on the nature of R group there are many amino acids. Amino acids can be classified by the characteristics of their side chains.

(New NCERT, 11th, Page No.-106)

166. (4)

In Urochordata, notochord is present only in larval tail, while in Cephalochordata, it extends from head to tail region and is persistent throughout their life.

(New NCERT, 11th, Page No.-46)

167. (1)

A particular property of amino acids is the ionizable nature of $-NH_2$ and – COOH groups. Hence in solutions of different pH, the structure of amino acids changes.

(New NCERT, 11th, Page No.- 106)

168. (4)

Chondrichthyes are marine animals with streamlined body and have cartilaginous endoskeleton. Platypus is a mammal which is oviparous. *Crocodilus* is a reptile which has four chambered heart. Some chordates does not have jaw such as Lampray.

(New NCERT, 11th, Page No.-47)

169. (1)

Glycogen is a polysaccharide which is polymer of glucose which is stored form of glucose in animals and not in plants.

(New NCERT, 11th, Page No.-110)

170. (2)

Nematocysts are present in animals of phylum coelenterata (eg:-*Meandrina* - Brain coral). Phylum Ctenophora posses radial symmetry. *Wuchereria* belongs to phylum aschelminthes.

(New NCERT, 11th, Page No.-41, 42, 43)

171. (1)

Elemental composition of oxygen in human body is around 65% which can be estimated by elemental analysis of all the elements in the body.

(New NCERT, 11th, Page No.-105)

172. (4)

Members of phylum porifera are commonly known as sponges. They are generally marine and mostly asymmetrical animals. *Spongilla* is a fresh water sponge.

(New NCERT, 11th, Page No.-40)

173. (2)

Polyp phase is present in Hydra, *Adamsia*, *Obelia* etc. *Aurelia* or jelly fish have medusa form.

(New NCERT, 11th, Page No.-41)

174. (3)

In human beings, skeletal system is made up of 206 bones and a few cartilages. There are 12 pairs of ribs. Sternum is a flat bone on the ventral midline of thorax. The number of cervical vertebrae are seven in almost all mammals including human beings. Ribs have two articulation surfaces on its dorsal end and is hence called bicephalic.

(New NCERT, 11th, Page No.-224, 225)

175. (4)

The chemical and physical properties of amino acids are essentially of the amino, carboxyl and the R-functional groups.

(New NCERT, 11th, Page No.- 106)

176. (4)

Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis. Insulin acts mainly on hepatocytes and adipocytes (cells of adipose tissue), and enhances cellular glucose uptake and utilisation. As a result, there is a rapid movement of glucose from blood to hepatocytes and adipocytes resulting in decreased blood glucose levels (hypoglycemia). Insulin also stimulates conversion of glucose to glycogen (glycogenesis) in the target cells. Gluconeogenesis is stimulated by glucagon hormone.

(New NCERT, 11th, Page No.-245, 246)

177. (2)

Members of phylum porifera are commonly known as sponges. They are generally marine but few are freshwater, mostly asymmetrical and acoelomate.

(New NCERT, 11th, Page No.-40)

178. (4)

Phylum hemichordata consists of a small group of worm-like marine animals with organ-system level of organisation. They are bilaterally symmetrical, triploblastic and coelomate animals. The body is cylindrical and is composed of an anterior proboscis, a collar and a long trunk.

(New NCERT, 11th, Page No.-45)

179. (1)

The correct sequence of depolarisation and repolarisation is:- Stimulus applied at a site on polarised membrane which increases permeability of Na^+ due to which Na^+ moves inside and generates action potential. The rise in the stimulus-induced permeability to Na^+ is extremely short-lived. It is quickly followed by a rise in permeability to K^+. Within a fraction of a second, K^+ diffuses outside the membrane and restores the resting potential of the membrane at the site of excitation and the fibre becomes once more responsive to further stimulation.

(New NCERT, 11th, Page No.-233)

180. (1)

The acid soluble pool represents roughly the cytoplasmic composition.

(New NCERT, 11th, Page No. -109)

181. (2)

On an average, 1100-1200 ml of blood is filtered by the kidneys per minute i.e. nearly 20 ml of blood is filtered out per second.

(New NCERT, 11th, Page No.-208)

182. (4)

Carcharodon is also known as 'Great white shark'. It belongs to class Chondrichthyes.

(New NCERT, 11th, Page No.-48)

183. (4)

Animals of phylum Arthropoda are mostly dioecious. Fertilisation is usually internal. They are mostly oviparous. Development may be direct or indirect.

(New NCERT, 11th, Page No.-44)

184. (2)

Star fish belongs to phylum Echinodermata. Digestive system is complete with mouth on the lower (ventral) side and anus on the upper (dorsal) side. Sexes are separate. Reproduction is sexual. Fertilisation is usually external. Development is indirect with free-swimming larva.

(New NCERT, 11th, Page No.-45)

185. (3)

The respiratory system in cockroach consists of a network of trachea, that open through 10 pairs of small holes called spiracles present on the lateral side of the body. Thin branching tubes (tracheal tubes subdivided into tracheoles) carry oxygen from the air to all the parts of body.

(Old NCERT, 11th, Page No.-113)

SECTION-B

186. (3)

Glucosamine is chemically modified sugar. Chitin is a homopolymer.

(New NCERT, 11th, Page No.- 111)

187. (4)

List-I	List-II
6-15 pairs of gill slits	*Cyclostomes*
Placoid scales	Chondrichthyes
Air bladder	Osteichthyes
Poison sting	*Trygon*

(New NCERT, 11th, Page No.-47, 48)

188. (4)

Receptors associated with aortic arch and carotid artery can recognise changes in CO_2 and H^+ concentration and send necessary signals to the respiratory rhythm centre for remedial actions.

(New NCERT, 11th, Page No.-190)

189. (4)

Acid soluble pool contains thousands of organic compound and inorganic compounds like sulphate, phosphate, etc.

(New NCERT, 11th, Page No.-105)

190. (3)

Metagenesis is observed in cnidarians. The body in ctenophores bears eight external rows of ciliated comb plates, which help in locomotion. Water vascular system is characteristic of Echinodermata.

(New NCERT, 11th, Page No.-41, 42)

191. (1)

Certain amino acids are essential for our health and they have to be supplied through our diet. Hence, dietary proteins are the source of essential amino acids.

(New NCERT, 11th, Page No.-109)

192. (1)

'PQ' in ECG represents atrial contraction i.e atrial systole. This increases the flow of blood into the ventricles by about 30 per cent.

(New NCERT, 11th, Page No.-201)

193. (4)

Due to the absence of air bladder in Chondrichthyes, they have to swim constantly to avoid sinking. Teeth are modified placoid scales which are backwardly directed.

(New NCERT, 11th, Page No.-47)

194. (4)

Lipids are compounds of carbon, hydrogen and oxygen. They are insoluble in water and contains mainly both fatty acids and glycerol.

(New NCERT, 11th, Page No.-106)

195. (3)

Force generated by the muscles is used to carry out movement through joints, where the joint acts as a fulcrum. Joints are the point of contact between bones or between bones and cartilages.

(New NCERT, 11th, Page No.-227)

196. (1)

Annelida, Arthropoda and Chordata all possesss organ system level of organisation, bilateral symmetry and true coelomates.

Aschelminthes are pseudocoelomate animals.

(New NCERT, 11th, Page No.-43, 44, 46)

197. (2)

Palmitic acid and arachidonic acid contains 15 and 19 number of carbon atoms respectively (excluding carboxyl group).

(New NCERT, 11th, Page No.-106)

198. (4)

Animals accumulate ammonia, urea, uric acid, carbon dioxide, water and ions like Na^+, K^+, Cl^-, phosphate, sulphate, etc., either by metabolic activities or by other means like excess ingestion. These substances have to be removed totally or partially.

(New NCERT, 11th, Page No.-205)

199. (4)

Platyhelminthes have organ level of body organisation. Bilateral symmetry is the most common symmetry found in animals. All triploblastic animals does not have true coelom, Aschelminthes are triploblastic but have pseudocoelom.

(New NCERT, 11th, Page No.-42, 51)

200. (2)

The correct sequence of working of FSH is: Binding to membrane receptor → Generation of second messenger → Biochemical response →Physiological response.

(New NCERT, 11th, Page No.-248)

■■■

PW Web/App - https://smart.link/7wwosivoicgd4

Library- https://smart.link/sdfez8ejd80if